Carbon Monoxide Safety

Carbon monoxide (CO) is a poisonous, colorless, odorless, and tasteless gas. It is produced by the incomplete burning of solid, liquid, and gaseous fuels. Appliances fueled with natural gas, liquefied petroleum (LP gas), oil, kerosene, coal, or wood may produce CO. Burning charcoal and running cars also produces CO. Industrially, forges, blast furnaces and coke ovens produce CO, but one of the most common sources of exposure in the workplace is the internal combustion engine. You may be exposed to harmful levels of CO in boiler rooms, breweries, warehouses, petroleum refineries, pulp and paper production, and steel production; also, around docks, blast furnaces, or coke ovens. You may also be exposed to CO as a result of one of the following occupations: welder, garage mechanic, firefighter, carbon-black maker, organic chemical synthesizer, metal oxide reducer, longshore worker, diesel engine operator, forklift operator, marine terminal worker, toll booth or tunnel attendant, customs inspector, police officer, or taxi driver.

Every year hundreds of people die accidentally from CO poisoning caused by malfunctioning or improperly used fuel-burning appliances. Even more die from CO produced by idling cars. CO is harmful when breathed because it displaces oxygen in the blood and deprives the heart, brain, and other vital organs of oxygen. Large amounts of CO can overcome you in minutes without warning–causing you to lose consciousness and suffocate. You should know the symptoms of CO poisoning. At moderate levels, you or your family can get severe headaches, become dizzy, mentally confused, nauseated, tightness across the chest, or faint. Sudden chest pain may occur in people with angina. During prolonged or high exposures, symptoms may worsen and include vomiting, confusion, and collapse in addition to loss of consciousness and muscle weakness. CO poisoning may occur sooner in those most susceptible: young children, elderly people, people with lung or heart disease, people at high altitudes, or those who already have elevated CO blood levels, such as smokers. CO also poses a special risk to fetuses.

CO poisoning can be reversed if caught in time. But even if you recover, acute poisoning may result in permanent damage to the parts of your body that require a lot of oxygen such as the heart and brain. Significant reproductive risk is also linked to CO. If you think you are experiencing any of the symptoms of CO poisoning, get fresh air immediately. Open windows and doors for more ventilation, turn off any combustion appliances, and leave the house or work-site. Call the fire department and/or 911 to report your symptoms and seek medical attention. If you suspect someone else has CO

poisoning, move the victim immediately to fresh air in an open area; call 911 or another local emergency number for medical attention or assistance; if available, administer 100% oxygen using a tight-fitting mask if the victim is breathing; if the victim has stopped breathing administer cardiopulmonary resuscitation (CPR).

Warning: You may be exposed to *fatal* levels of CO poisoning in a rescue attempt. Only personnel skilled and trained in performing recovery operations and using appropriate recovery equipment should perform rescues. Employers should make sure that rescuers are not exposed to dangerous CO levels when performing rescue operations.

Prevention is the Key to Avoiding Carbon Monoxide Poisoning

To reduce the chances of CO poisoning at home, you should take the following actions:

- Have your fuel-burning appliances–including oil and gas furnaces, gas water heaters, gas ranges and ovens, gas dryers, gas or kerosene space heaters, fireplaces, and wood stoves–inspected by a trained professional at the beginning of every heating season. Make certain that the flues and chimneys are connected, in good condition, and not blocked.
- Choose appliances that vent their fumes to the outside whenever possible, have them properly installed, and maintain them according to manufacturers' instructions.
- Read and follow all of the instructions that accompany any fuel-burning device. If you cannot avoid using an unvented gas or kerosene space heater, carefully follow the cautions that come with the device. Use the proper fuel and keep doors to the rest of the house open. Crack a window to ensure enough air for ventilation and proper fuel-burning.
- Do not idle the car in a garage–even if the garage door to the outside is open. Fumes can build up very quickly in the garage and living area of your home.
- Do not use a gas oven to heat your home, even for a short time.
- Do not use a charcoal grill indoors–even in a fireplace.
- Never use portable fuel-burning camping equipment inside a home, garage, vehicle, or tent.
- Do not sleep in any room with an unvented gas or kerosene space heater.
- Do not use any gasoline-powered engines (mowers, weed trimmers, snow blowers, chain saws, small engines or generators) in enclosed spaces.
- Do not ignore symptoms, particularly if more than one person is feeling them. You could lose consciousness and die if you do nothing.
- Install a CO detector/alarm that meets the requirements of the current UL standard 2034 or the requirements of the IAS 6-96 standard. A carbon monoxide detector/alarm can provide added protection, but it is no substitute for proper use and upkeep of appliances that can produce CO. Install a CO detector/alarm in the hallway near every separate sleeping area of the home. Make sure furniture or draperies cannot cover up the detector.

To reduce the chances of CO poisoning in the workplace, employers should take the following actions:

- Install an effective ventilation system that will remove CO from work areas.
- Maintain equipment and appliances (e.g., water heaters, space heaters, cooking ranges) that can produce CO in good working order to promote their safe operation and to reduce CO formation.
- Consider switching from gasoline-powered equipment to equipment powered by electricity, batteries, or compressed air if it can be used safely.
- Prohibit the use of gasoline-powered engines or tools in poorly ventilated areas.
- Provide personal CO monitors with audible alarms if potential exposure to CO exists.
- Test air regularly in areas where CO may be present, including confined spaces.
- Install CO monitors with audible alarms.
- Use a full-facepiece pressure-demand self-contained breathing apparatus (SCBA) certified by the National Institute for Occupational Safety and Health (NIOSH), or a combination full-facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply in areas with high CO concentrations, i.e., those immediately dangerous to life and health atmospheres.
- Use respirators with appropriate canisters for short periods under certain circumstances where CO levels are not exceedingly high.
- Educate workers about the sources and conditions that may result in CO poisoning as well as the symptoms and control of CO exposure
- If your employees are working in confined spaces where the presence of CO is suspected, you must ensure that workers test for oxygen sufficiency before entering.

Employees should do the following to reduce the chances of CO poisoning in the workplace:

- Report any situation to your employer that might cause CO to accumulate.
- Be alert to ventilation problems–especially in enclosed areas where gases of burning fuels may be released.
- Report promptly complaints of dizziness, drowsiness, or nausea.
- Avoid overexertion if you suspect CO poisoning and leave the contaminated area.
- Tell your doctor that you may have been exposed to CO if you get sick.
- Avoid the use of gas-powered engines, such as those in powered washers as well as heaters and forklifts, while working in enclosed spaces.